

Patent Application No. 09/841,932

IN THE CLAIMS:

Please amend claims 1, 7, 8 and 13, and cancel claims 5 and 12 as follows:

Claim 1. (currently amended) An image processing method comprising the steps of:

dividing an inputted image into pixel groups, each of which has a specified size;

5 calculating a pixel group density for each of the divided pixel groups; ~~and~~

calculating an output value of a certain watched pixel based on an absolute density of the watched pixel and a relative density for the watched pixel, the relative density being calculated based on the
10 pixel group density of the pixel group, to which the watched pixel belongs, and the pixel group density of the pixel group adjacent to the pixel group, to which the watched pixel belongs, among the pixel groups in the image; and

wherein the relative density is calculated based on an influence
15 degree obtained by a trapezoidal function representing a positional relation between a coordinate position of the watched pixel and the pixel group adjacent to the pixel group, to which the watched pixel belongs.

Claim 2. (original) The image processing method according to claim 1,

wherein the step of dividing an inputted image into the pixel groups is meshing the image into sub images, each of which has a
5 rectangular area.

Claim 3. (original) The image processing method according to claim 1,

wherein the relative density is calculated by use of an influence degree calculated based on a distance from the watched
5 pixel and the pixel group, to which the watched pixel belongs, to the pixel group adjacent to the pixel group, each of the adjacent pixel group being located on and under and at the right and left of the pixel group.

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Claim 4. (original) The image processing method according to claim 3,

wherein in the step of calculating the pixel group densities, an average density of the divided pixel group is calculated, and

5 the relative density is obtained by multiplying the respective average densities of the pixel group, to which the watched pixel belongs, and of the pixel group adjacent to the pixel group, to which the watched pixel belongs, by the respective influence degrees.

Claim 5. (canceled)

Claim 6. (original) The image processing method according to claim 1,

wherein in the step of calculating an output value, the relative and absolute densities are weighted to calculate the output value.

Claim 7. (currently amended) A relative density detecting method for detecting a relative density of a watched pixel constituting an inputted image, comprising the steps of:

5 dividing the image into pixel groups, each of which has a specified size;

detecting a pixel group density for each of the divided pixel groups;

extracting positional information for the watched pixel in a pixel group including the watched pixel; and

10 detecting a relative density of the watched pixel based on ~~the pixel group density and the positional information~~ an influence degree obtained by a trapezoidal function representing a positional relation between a coordinate position of the watched pixel and the pixel group adjacent to the pixel group, to which the watched pixel
15 belongs.

Claim 8. (currently amended) An image processing apparatus comprising:

pixel group dividing means for dividing an inputted image into pixel groups, each of which has a specified size;

5 pixel group density detecting means for detecting a pixel group density for each of the pixel groups divided by the pixel group

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dividing means;

weight deciding means for deciding each weight of the pixel groups adjacent to the pixel, to which a watched pixel belongs, based on a position of the watched pixel to be outputted;

watched pixel density detecting means for detecting a density of the watched pixel; and

relative density calculating means for calculating a relative density of the watched pixel based on a detected density of the watched pixel, a pixel group density of the detected pixel group and a decided weight of the pixel group; and

wherein the weight deciding means adds weights of pixel groups adjacent to a pixel group, to which the watched pixel belongs, to obtain a sum of 1, the pixel groups being located at the right and left of the pixel group, to which the watched pixel belongs, and/or adds weights of pixel groups adjacent to a pixel group, to which the watched pixel belongs, to obtain a sum of 1, the pixel groups being located on and under the pixel group, to which the watched pixel belongs.

Claim 9 (original) The image processing apparatus according to claim 8, further comprising:

output density calculation means for calculating an output density by weighting the density of the watched pixel detected by the watched pixel density detecting means and the relative density calculated by the relative density calculating means.

Claim 10. (original) The image processing apparatus according to claim 8,

wherein the pixel group dividing means roundly divides an inputted image into meshes, each of which has I pixels x J pixels (I, J: integers).

Claim 11. (original) The image processing apparatus according to claim 8,

wherein the weight deciding means comprises a table look-up for deciding weights of pixel groups adjacent to a pixel group, to which the watched pixel belongs, based on a coordinate position of the watched pixel, the pixel groups being located at the right and left

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of the pixel group, to which the watched pixel belongs, and/or on and under the pixel group, to which the watched pixel belongs.

Claim 12. (canceled)

Claim 13. (currently amended) An image processing apparatus for converting image data, which includes a specified object photographed by a digital camera, into a binarized image, comprising:

- a meshing unit for meshing the entire image data into sub
5 images;
an average density detection unit for detecting an average density of each of the sub images meshed by the meshing unit; and
a density detection unit for detecting a density of a pixel constituting the object, wherein a binarized image, in which an
10 outline of the object is emphasized, is generated based on a detected density of the pixel, an average density of the sub image, to which the pixel belongs, and an average density of the sub image adjacent to the certain sub image, the density detection unit configured to adds weights of sub images adjacent to a sub image, to which the
15 pixel belongs, to obtain a sum of 1.

Claim 14. (original) An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing image processing, the computer readable program code means in said article of manufacture comprising computer
5 readable program code means for causing a computer to effect the steps of claim 1.

Claim 15. (original) An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing relative density detection, the computer readable program code means in said article of manufacture comprising
5 computer readable program code means for causing a computer to effect the steps of claim 7.

Claim 16. (original) A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for causing image processing, said method steps comprising the steps of claim 1.

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Claim 17. (original) A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for causing relative density detection, said method steps comprising the steps of claim 7.

Claim 18. (original) A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing image processing, the computer readable program code means in said computer program product comprising
5 computer readable program code means for causing a computer to effect the apparatus of claim 8.